

formations in the Indian Ocean, marine crustaceans and the Lithothamnium. The first part of the second volume will be published next June.

An index, prepared by Mr. Clement Reid, F.R.S., for De la Beche's "Report on the Geology of Cornwall, Devon and West Somerset," has recently been published for the Geological Survey, and can be obtained from any agent for the sale of Ordnance Survey maps. The Report was published in 1839, unfortunately without an index. No less than 1500 copies were issued, and the memoir is now out of print. It has, however, become one of the classics of geology, and being a permanent work of reference, an index has been a great desideratum, which has now been supplied.

MESSRS. JOHN J. GRIFFIN AND SONS, LTD., have sent for our inspection a simple mechanical device for obtaining rapidly any required set of numbers having the same ratio among themselves as any other given set of numbers. The instrument is known as the "ratiometer," and was designed by Mr. A. E. Munby. It is made of boxwood, and consists of two graduated rules, which can be set at any angle, which with one edge of a T-square form a right-angled triangle. By means of a tongue and groove the base of the triangle slides along the stock of the T-square. The ratiometer should prove of great assistance to examiners for the reduction of marks. It would be useful in laboratories, where it could be used for such operations as the conversion of centimetres to inches, or of scales of temperature, and in the office and workshop for converting one linear scale into another when no simple ratio exists between the two, or for finding the value of various quantities of goods.

THE international committee on atomic weights, organised in 1900, and composed of more than fifty representatives from chemical and other societies, has by vote designated a smaller body of three representatives to carry on the future work of the committee. The three elected members, Profs. Clarke, Thorpe and Seubert, have just issued their annual report and recommendations. It is pointed out that upon the question as to whether oxygen or hydrogen shall be taken as basis of the atomic weight numbers, opinion at the present time seems to be evenly divided. To force the adoption of either appears to be impossible, and experience must be the final arbiter. That standard which best serves to coordinate chemical and physical knowledge will ultimately be chosen, and the other will gradually fall into disuse. Tables are appended to the report in which both standards of atomic weights are represented. In view of recent work, the committee has thought it necessary to make changes and recommendations in respect to the atomic weights of antimony, germanium, hydrogen, lanthanum, mercury, palladium, selenium, tin, uranium and zirconium. Radium appears for the first time in the table with an atomic weight = 225.

Up to the present time very few instances of chemical changes which exhibit periodicity have been observed. Very recently it was found by Ostwald that the velocity of solution of certain samples of chromium in acids does not change in a continuous manner as would be theoretically anticipated, but that the rate of solution increases and decreases periodically. An apparently similar change has been found by Bredig and Weinmayr in the catalytic decomposition of hydrogen peroxide by means of metallic mercury. An account of the authors' experiments is given in the current number of the *Zeitschrift für physikalische Chemie*. In successive intervals of time the amounts of hydrogen peroxide are alternately larger and smaller, and the alter-

nation appears to be simultaneous with a change in the character of the mercury surface. Preliminary experiments indicate that the alternations of the catalytic activity of the mercury are intimately connected with alternations in its electrical condition. In the inactive condition the mercury is considerably more electro-positive than in the active condition.

### OUR ASTRONOMICAL COLUMN.

#### ASTRONOMICAL OCCURRENCES IN MARCH:—

- March 10. 4h. 59m. to 5h. 50m. Moon occults  $\alpha$  Cancri (mag. 4.3).  
 14. 11h. 40m. Minimum of Algol ( $\beta$  Persei).  
 15. Venus. Illuminated portion of disc = 0.904, of Mars = 0.991.  
 15. Venus. Apparent diameter =  $11''.2$ , Mars =  $13''.8$ .  
 17. 8h. 29m. Minimum of Algol ( $\beta$  Persei).  
 18. 16h. 1m. to 17h. 25m. Moon occults  $\chi$  Ophiuchi (mag. 5.0).  
 21. 7h. Sun enters Aries, Spring quarter commences.  
 25. Perihelion Passage of Giacobini's comet (D 1900).  
 28. 14h. 5m. Annular eclipse of the sun, invisible at Greenwich.  
 28. 20h. Mars in opposition to the sun.  
 30. 20h. Venus in conjunction with the moon, Venus  $2^\circ 13' N$ .

COMET 1903 *a*.—M. Paul Brück, of the Besançon Observatory, publishes an ephemeris for this comet, from which the following is an abstract, in No. 3847 of the *Astronomische Nachrichten*.

#### Paris 12h. M.T.

| Date.  | <i>a</i> . app.<br>h. m. s. | $\delta$ app. | log <i>r</i> . | log $\Delta$ | Brightness. |
|--------|-----------------------------|---------------|----------------|--------------|-------------|
| Mar. 6 | 0 13 52                     | +17 27.9      |                |              |             |
| " 8    | 0 18 26                     | +18 3.9       | 9.6919         | 0.0141       | 18.1        |
| " 10   | 0 22 57                     | +18 31.8      |                |              |             |
| " 12   | 0 27 18                     | +18 48.1      |                | 9.9602       |             |
| " 14   | 0 31 22                     | +18 48.5      |                |              |             |
| " 16   | 0 35 3                      | +18 27.9      | 9.6251         | 9.9010       | 41.3        |

From an observation by M. Chofardet on February 13, a correction of  $\Delta a = -4s$ ,  $\Delta \delta = -0''.2$  to this ephemeris was obtained, and the magnitude was recorded as about 9.0.

The comet was observed at Lyons by MM. G. le Cadet and J. Guillaume on various dates between January 21 and 29, and they record it as "a faint nebulosity without elongation and without tail."

A new set of elements, published in the same journal by M. G. Fayet, gives the time of perihelion passage as March 18.7092 M.T. Paris.

COMET 1902 *b* (PERRINE).—An ephemeris for this comet is published in No. 3847 of the *Astronomische Nachrichten*, by Herr Ebell, as a continuation of that which appeared in No. 3841 of the same journal. It indicates that the comet is rapidly becoming fainter, and an observation made at Strasburg on February 17 showed that, on that date, the magnitude was only about 11.5.

HERSCHEL'S NEBULOUS REGIONS OF THE HEAVENS.—Commenting on Dr. Isaac Roberts's recently published results, which indicated that only four of the fifty-two nebulous regions described by Herschel in 1811 really contained nebulosities, Prof. E. E. Barnard remarks that this question is likely to prove an important factor in future discussions as to the physical condition of the universe, and then proceeds to explain that the negative results obtained by Dr. Roberts may be due to insufficient exposure, and that it is highly improbable that Herschel should have been so palpably mistaken in forty-eight cases out of his fifty-two regions.

In support of his argument Prof. Barnard proceeds to describe several photographs, which he has obtained with a 1.5-inch magic lantern lens of 4.9 inches equivalent focus, which suggest that in one or two cases at least Dr. Roberts's conclusions require further consideration.

One striking instance is illustrated by a reproduction showing a great curved nebulosity which embraces the

greater part of the constellation Orion, and of which the brightest part corresponds, in position, with Herschel's region No. 27. Of this region Dr. Roberts remarked "sky clear, stars very few in number, large areas void of stars, no nebulosity," yet the photograph shows a distinct nebulosity in this region, and photographs obtained by two independent observers, with three different photographic telescopes, on several different occasions, confirm Herschel's observations.

Both Dr. Roberts's results and Prof. Barnard's comments thereon appear in No. 1, vol. xvii. of the *Astrophysical Journal*.

**A NEW STAR CATALOGUE.**—Volume viii. of the *Annalen* of the Leyden Observatory, edited by Dr. H. G. van de Sande Bakhuyzen, is a new catalogue of 10,239 stars situated in the zone  $29^{\circ} 50'$  to  $35^{\circ} 10'$  north latitude, and having magnitudes of 9.5 or brighter.

The observations have been made and reduced at Leyden, in accordance with the programme of the *Astronomischen Gesellschaft*, during the years 1870-1876 and 1880-1889, by Messrs. W. Valentiner, E. F. van de Sande Bakhuyzen, E. Becker, J. H. Wilterdink and H. G. van de Sande Bakhuyzen, and the observations of the former period have been already published in vols. iv. and v. of the *Annalen*.

The catalogue gives the position for 1875, the magnitude, the precessional and secular variation in each coordinate, the epoch and the B.D. number (where there is one) for each star, and, in additional tables, these positions are compared with those given in the Bessel, Argelander, Struve and other catalogues for the same objects.

## RECENT SCIENCE IN AUSTRIA.

### Chemistry.

**A** PERUSAL of the *Sitzungsberichte* of the Vienna Academy of Sciences indicates that a great deal of valuable chemical research work is being carried out by Austrian investigators. In the concluding section of vol. cx., J. Klimont gives an account of experiments on the composition of oleum cacao which indicate that this substance can no longer be regarded as a mixture of tristearin, tripalmitin and triolein, but that it is essentially a mixed glyceride containing the radicles of these three acids united to one and the same glycerin radicle. Other mixed glycerides containing oleic acid and fatty acids of smaller molecular weight are also present in the fat.

The action of acetylene as cathodic depolarising agent in the electrolysis of acid and alkaline solutions has been investigated by Dr. Billitzer, who finds that this substance readily acts as depolariser with a kathode of platinum, and that the products of its action are ethylene and ethane. Within certain limits of potential, it is possible to obtain a quantitative yield of ethylene. If the potential is gradually increased, mixtures of ethylene and ethane are produced at the kathode, and later hydrogen also makes its appearance. In sulphuric acid solution and with a mercury kathode, small quantities of alcohol are also formed from the acetylene.

The nature of that physiologically most important substance, chitin, has been further investigated by Drs. Fränkel and Kelly. The view advanced by Schmiedeberg that chitin is an  $\alpha$ -acetyl-acetoacetic acid compound of chitosamine of the formula  $C_{18}H_{30}N_2O_{12}$  can no longer be regarded as correct in the light of this more recent work. This conception of the nature of chitin was largely based on the production of chitosamine and acetic acid by boiling with strong hydrochloric acid, but the authors' experiments indicate that its constitution cannot possibly be of such a simple character.

In vol. cxi., Dr. von Cordier describes a peculiar reaction exhibited by iron and steel. If iron containing carbon and nitrogen is treated with dilute acid and excess of ammonia added to the solution, a distinct odour of carbamine is observable. The author's experiments indicate that the reaction is only obtained if both these elements are contained in the same sample of iron. A mixture of two samples, one containing carbon but no nitrogen, the other nitrogen but no carbon, does not evolve any isonitrile. Investigation of the small quantity of gas given off shows that it is ethylcarbamine.

In a series of papers, Prof. Wegscheider discusses the question of the influence of constitution on the affinity constants of organic acids and gives the results of his experiments on the

partial esterification of unsymmetrical di- and poly-basic acids. Special attention is devoted to the alteration produced in the affinity constant by the substitution of hydrogen by ester groups such as  $SO_3CH_3$ ,  $CC_2CH_3$ ,  $CO_2C_2H_5$  and by the carboxyl group. A considerable addition to our knowledge of this subject results from these investigations. The data obtained are utilised by the author to determine the configuration of the ester acids obtained by partial esterification of unsymmetrical polybasic acids.

Two other papers by Dr. Billitzer treat of the acid character of acetylene and the formation of carbon ions in aqueous solution. In the first of these, the solubility of acetylene in solutions of the alkalis has been studied. By suitable elimination of the physical action of the dissolved bases, it is shown that acetylene undoubtedly forms salts in the alkaline solutions and that it must be regarded as a very weak acid, its dissociation being about  $1/40000$ th of that of carbonic acid. In the second paper, the presence of carbon ions in solutions of silver and copper acetylides is shown by electromotive measurements, and by electrolysis of these solutions under suitable conditions a small deposit of carbon has been obtained on the anode. By two independent methods, the electrolytic dissociation of acetylene has thus been demonstrated.

### Physics.

In mathematics, attention should be directed to F. Mertens's proof of Galois' fundamental theorem of the groups of an equation the coefficients of which belong to a given range of rationality. A construction for the six normals from any point to a conicoid, based on the methods of synthetic geometry alone, is given by Prof. August Adler.

In theoretical physics, perhaps the most extended mathematical investigations are those by Dr. Josef Grünwald dealing with the propagation of waves in uniaxial crystals when the initial disturbances are given. Dr. Grünwald finds for the vector potential a series of waves partly "ordinary," partly "extraordinary" and partly "intermediate" in character. A formula is discussed by G. Jaumann for the heat generated in the motion of a viscous liquid. The expression involves volume integrals of the squares of the curl, and divergence and a surface integral; in the case of an incompressible liquid, this result agrees with the known formulæ in which the only volume integral is that involving the square of the curl. The difficult subject of astronomical aberration and its relation to the ether is discussed by Dr. Egon v. Oppolzer, and in molecular physics, Prof. O. Tumlirz's paper on the "cohesion pressure" terms in Van der Waals's equation, H. Mache's discussion of the relative magnitudes of molecules in a liquid and its vapour, and Dr. G. Jäger's investigation of the law of partition of energy between the liquid and the vapour may be noticed.

In spectroscopy, Dr. Edward Haschek has been working at the relation between wave-length and quantitative composition, and while the conclusions are on the whole remarkably consistent, it appears that at present the method is unsuited generally for laboratory analysis. In collaboration with Prof. Exner, Dr. Haschek has drawn up a list of the spectral lines of europium, including 1193 spark and 527 arc lines. The element europium has also had its magnetic properties compared with gadolinium and samarium by Dr. Stefan Meyer, the preparations of  $Eu_2O_3$  having been obtained from Demarcay.

The diathermanosity of water and certain solutions forms the subject of a paper by Otto Dechant, who finds that as the temperature increases the transparency for heat decreases according to a formula approximately linear. Alum solution is only 2 per cent. less diathermanous than water, but cobalt chloride is better, and its coefficient decreases more rapidly after  $50^{\circ}$  than between  $11^{\circ}$  and  $50^{\circ}$ .

That the freezing points of aqueous solutions are lowered by pressure to a greater extent than that of water is the conclusion of A. Lampa.

In terrestrial physics, a long series of tables relating to rainfall and *inter alia* its supposed connection with sun-spots is drawn up by J. Hann, and Prof. B. W. Stankewitsch describes magnetic measurements made with a "magnetic theodolite" in Pamir during his travels in 1900.

The series of papers on atmospheric electricity includes a comparison of brush electrodes and flame electrodes by Dr. Victor Conrad and a description of a self-registering atmospheric electrometer by Dr. Hans Bensdorf.

Electric discharges form the subject of papers by J. Nabl, in